

WO 2004/002216

PCT/CA2003/000964

SEQUENCE LISTING

<110> University of Guelph

<120> Novel Inducible Genes From Alfalfa And Method Of Use Thereof

<130> 08-892370WO

<140> n/a

<141> 2003-06-27

<150> 60/392,444

<151> 2002-06-28

<160> 19

<170> PatentIn version 3.1

<210> 1

<211> 474

<212> DNA

<213> Nucleotide sequence of H7 coding region

<400> 1

```
atgggtgttt ttactttcaa tgatgaacat gtctcaaccg tggctccagc taaactctac      60
aaggctcttg caaaagatgc tgatgaaatc gtcccaaagg tgatttctgc tgcccaaagt      120
gttgaaattg ttgaaggaaa tggaggaccc ggaactatta agaagctatc cattgttgaa      180
gatggcaaaa ccaactttgt gctacacaaa ttagattcag tggatgaggc aaactttgga      240
tataactaca gcttagtggg aggaacaggg ttggatgaaa gtttagagaa agttgaattt      300
gagacaaaaa ttgttgctgg ctctgatggg ggatccattg ttaagatttc agtgaaatac      360
cataccaaag gtgatgcaac tctatctgaa gcagtacgtg aggagactaa ggccaaagga      420
actggactta tcaaggccat tgagggtctac gtttagcaa accctaatta ctag          474
```

<210> 2

<211> 678

<212> DNA

<213> Nucleotide sequence of H11 coding region

<400> 2

```
atggcctcca cactcagtct tgtcaagctt cccattcttt caagcatcaa gacacgccaa      60
tcaacctcaa aacatgttgt tccacttcca tccaaattca atattgtccc tcccacccca      120
ctaaagtttt cattagatca tcaaattaat atcaaacaaa cttctcttct atccctcaca      180
gcaatcacat ttccattctt attggatacc aaagagtttg ggatatttga aggaagaaca      240
tttgctctca ttcaccccat tgtgttgggt ggtttgttct tctatactct atatgctggc      300
tatttggggg ggcaatggcg ccgagttagg actattcaaa atgatattaa tgagctcaag      360
aaacaactca aacctgcacc ggtcgcccct gatggtaaag cacttgaaac ttcaccgcca      420
```

tcacctgttg aacttcaaat ccagaaactt actgaggaga ggaaagagct tatcaaaggt	480
tcatacaggg ataaacactt taatgctgga tccatacttc taggatttgg tgtctttgag	540
gctgttggtg tgaggactca acacatgggt aaggacagga aagctatttc caggccaca	600
tttatttgca ggagcaggca ttaccgtctt atgggcactg gcagcagctc tagtaccacc	660
gatgcagaaa ggcagtga	678

<210> 3

<211> 744

<212> DNA

<213> Nucleotide sequence of H12 coding region

<400> 3

atggcaacca acgaagatca aaagcaaact gaatctggaa gacatcaaga agttgggtcac	60
aagagtcttt taaaaagtga tgctctttac cagtatattc tagagaccag tgtcttccca	120
agagaacatg aagccatgaa agagttgaga gaggtcacag caaacacccc atggaacatc	180
atgacaacct ctgcagatga aggacaattt ttgagcatgc tccttaaact tatcaatgct	240
aagaatacca tggaaattgg tgtctacact ggctactccc tccttgccac tgccttagct	300
attcctgaag atggaaagat tttggctatg gacattaaca aagaaaatta cgaattgggt	360
ctacctgtaa ttaaaaaagc tgggtgtgat cacaaaattg atttcagaga aggtccagct	420
cttcagttc ttgatgaaat gatcaaagac gaaaagaatc atggtagcta cgatttcatt	480
tttgtggatg ctgacaaaga caattacctc aactaccata agaggttaat tgatcttggt	540
aaagtgggag gtgtgatcgg gtacgacaac accttatgga atggatctgt ggttgcaccc	600
cctgatgctc cattgaggaa gtatgttagg tactatagag attttgtttt ggagcttaac	660
aaggctttgg ctgtggaccc taggattgaa atatgtatgc ttctgttgg tgatggaatc	720
actatctgcc gtaggatcaa gtaa	744

<210> 4

<211> 634

<212> DNA

<213> Nucleotide sequence of H7 regulatory region

<400> 4

acgcgtgggc gacggcccgg gctggtacta aagtattact attaccaaatt ttttaggacc	60
ccacccatga caccattgct atatttcaat ttgggaaaat attgctataa agttactgta	120
gtaactttta gaagaagggt ttttttttaa ggattttaga ggaagggttag caacacacat	180
gcactttaaa tatacatttt ttcttataaa gtttttgat cgagttgaga aatcatatat	240
atactcataa atcatgtgga tttcatataa tttaatagaa cacataaatt ttaaccgaga	300
aataaagtgt tgcaaataa tgttaaaaga gtacgttggt aacattattd taatttcttd	360

tattcaatcc acactttgag tcatggactg ctataactaat tcattttgtt tttcgcaacc 420
 taattagaga ttgtccagat acaaagagga gtaacctaat aaataaatat taaaatattc 480
 accaacggcc tcagtaagct acttgagcta aacaatgaga tttccaaata aggtaggtcc 540
 ttcccaagtt ctataaatag catccctcac catgtcataa accgcatcac aagttatata 600
 ctgtattcat actatacact tatcctttca tttta 634

<210> 5
 <211> 438
 <212> DNA
 <213> Nucleotide sequence of H11 regulatory region

<220>
 <221> misc_feature
 <222> (1)..(438)
 <223> where "n" is a or g or c or t or other

<400> 5
 cagaaccccg anaggctggt gctagtatgg cttcgttgta atacgactca ctatagggcg 60
 cgcggtggtcg acggcccggg ctggtatcag cgagtaacga ttcatcatat ctcacactag 120
 ggatgaatga tttattattg agtttatgaa tttgaactat tacttctaata ttctaaatga 180
 agacatttaa gtaaaagatt aaaatattct agtttcaaata attttggatt ttagaattta 240
 aatttaattct ttaaaaaaaaa attaaattta aagaagataa aaaggagaa aataaataga 300
 tgaatataat ttgtaaacat gaagacctta totccagtaa aaaaacatat ggaccttacc 360
 tttttgaggt aggaaggatc tacgcgggga acctcttctt gactgtgaac cccgtatgca 420
 gaggcagaga cagagagt 438

<210> 6
 <211> 936
 <212> DNA
 <213> Nucleotide sequence of H12 regulatory region

<400> 6
 aaatacaaag gtgaccttat tttgcaaata atccatgcat ggaaatgcat catccttttg 60
 aaaatgggtt tatctgaatt cttagtttac gtgaaaattt aatacatttc attttagata 120
 aatttattat taaaattcac acttagatgg cctaaaaatt aacacttatt tttacaatt 180
 caaataaaat atacgacgaa atgagtgtaa tttagttggt taagcatcgt caaagcttgg 240
 agagaaagat catagtttga tctttgaaaa ctatactatt gaaaagggtg aagatatcta 300
 acctccaaca aaatttattt gatagtcgat tcaaattatc aaaatttggg aaatattttg 360
 taaattgtta agttgggaaa aatatgttaa ttttcaaatt accatttgca catttttcta 420
 atctcaaata acatttaagg gatgttgact actttcgttt tgtacaaata tttacaattt 480

taacatttat aaaatgtgtt ttggtagata aaaagtgtga gtattcttta taagagattg 540
 tgtttttctt ttgttttaac ttataaaata aatatatatt ttattttatt ttaacgtgag 600
 attgtaagaa ttcattataa gattatgtca ttccctcaaa agaaaattag atgatgtcat 660
 tttcataact cattttctat aaatacagaa aatcctcaaa aatgaaaaac ctcggtcaaa 720
 aaataaaaga aaaacatcaa tagtggactg gcccacactc attgctttgc tttagtatga 780
 gaaagtagac ctcaccaacc acgaaccgga cgccgaccgg ttcaaccaaa catcacacca 840
 attttcctaa accataccgg tttttccctc ccttatataa ccatcctctc ccctcttctc 900
 taaccaagct tcattcaact cttcaacaca tatcag 936

<210> 7

<211> 1424

<212> DNA

<213> Nucleotide sequence of genomic H7

<400> 7

acgcgtgggc gacggcccg gctggtacta aagtattact attaccaaatt ttttaggacc 60
 ccacccatga caccattgct atatttcaat ttgggaaaat attgctataa agttactgta 120
 gtaactttta gaagaagggt ttttttttaa ggattttaga ggaagggttag caacacacat 180
 gcacttttaa tatacatttt ttcttataaa gtttttgtat cgagttgaga aatcatatat 240
 atactcataa atcatgtgga tttcatataa tttaatagaa cacataaatt ttaaccgaga 300
 aataaagtgt tgcaaatata tgtaaaaaga gtacgttggt aacattattt taatttcttt 360
 tattcaatcc acactttgag tcatggactg ctatactaatt tcattttggt tttcgcaacc 420
 taattagaga ttgtccagat acaaagagga gtaacctaat aaataaatat taaaatatc 480
 accaagggcc tcagtaagct acttgagcta aacaatgaga tttccaaata aggtagggtcc 540
 ttcccaaggt ctataaatag catccctcac catgtcataa accgcatcac aagttatata 600
 ctgtattcat actatacact tatcctttca tttacttctt gcatattgat ccttggtatc 660
 ttgatataa tatcatgggt gtttttactt tcaatgatga acatgtctca accgtggctc 720
 cagctaaact ctacaaggct cttgcaaaag atgctgatga aatcggtcca aaggtgattt 780
 ctgctgcca aagtgttgaa attggtgaag gaaatggagg acccggaact attaagaagc 840
 tatccattgt tgaagatggc aaaaccaact ttgtgtctca caaattagat tcagtggatg 900
 aggcaaactt tggatataac tacagcttag tgggaggaac aggggttgat gaaagtttag 960
 agaaagttga atttgagaca aaaattgttg ctggctctga tgggtgatcc attgttaaga 1020
 tttcagtga ataccatacc aaagggtgat caactctatc tgaagcagta cgtgaggaga 1080
 ctaaggccaa aggaactgga cttatcaagg ccattgaggg ctacgtttta gcaaacccta 1140
 attactagcc aattaaacc tattgaggac ttttaatttg gttgtgttgt ttcattgcga 1200

taataattaa agtttatgat gcggttgaag tgtgttgagt atacatcaag gtctttggct 1260
 cgtacatgtg tgttggcttt gttggatgtt gtgaggtttg agtgctatct tgggtgttta 1320
 aaaacaaaaa cctatgttgt gttggtgata aggttttgca ccatctgtat tatgcaataa 1380
 ataatgcaaa agaattttat cgcgaaaaaa aaaaaaaaaa aaaa 1424

<210> 8
 <211> 1482
 <212> DNA
 <213> Nucleotide sequence of genomic H11
 <220>
 <221> misc_feature
 <222> (1)..(1482)
 <223> Where n is a or g or c or t or other

<400> 8
 cagaaccccc anaggctggt gctagtatgg cttcgttgta atacgactca ctatagggcg 60
 cgcggtggtcg acggcccggt ctggtatcag cgagtaacga ttcacatcat ctcacactag 120
 ggatgaatga tttattattg agtttatgaa ttggaactat tactttctaatt ttctaaatga 180
 agacatttaa gtaaaagatt aaaatattct agtttcaaatt attttggatt ttagaattta 240
 aatttaattct ttaaaaaaaaa attaaattta aagaagataa aaagggagaa aataaataga 300
 tgaatataat ttgtaaacat gaagacctta tctccagtaa aaaaacatat ggaccttatc 360
 tttttgaggt aggaaggatc tacgcgggga acctcttcct gactgtgaac cccgtatgca 420
 gaggcagaga cagagagtat ggcctccaca ctgagtcttg tcaagcttcc cattctttca 480
 agcatcaaga cagccaatc aacctcaaaa catgttggtc cacttccatc caaattcaat 540
 attgtccctc ccacccact aaagttttca ttagatcatc aaattaatat caaacaact 600
 tctcttctat cctcacagc aatcacattt ccattcttat tggataccaa ggcaagcaag 660
 caagcaagca tcctattcta ttctattctt tcatccatat ctttactctt ttgttttcta 720
 accaatccat gatatgaatg ttgttgaaac aggatgcact tgctgttggt ggagagtttg 780
 ggatatttga aggaagaaca ttgctctca ttcaccccat tgtgttgggt ggtttgttct 840
 tctatactct atatgctggc tatttgggggt ggcaatggcg ccgagttagg actattcaaa 900
 atgatattaa tgagctcaag aaacaactca aacctgcacc ggtcgccct gatggtaaag 960
 cacttgaaac ttcaccgcca tcacctgttg aacttcaaatt ccagaaactt actgaggaga 1020
 ggaaagagct tatcaaagggt tcatacaggg ataaacactt taatgctgga tccatacttc 1080
 taggatttgg tgtctttgag gctgttggtg tgaggactca acacatgggt aaggacagga 1140
 aagctatttc caggtccaca tttatttgca ggagcaggca ttaccgtctt atgggcactg 1200
 gcagcagctc tagtaccacc gatgcagaaa ggcagtgaag cagccagaaa tcttcacatt 1260

gctctgaata cattgaatgt tcttctcttt gtgtggcaga ttcccactgg acttgatatt 1320
 gtatggaaag tgtttgagtt cacaaaatgg ccttgaatgt atgattctca tatgtaagta 1380
 agttcccagg tatttttactt tcaaatcagt atttggcaat atcaataaat gcaaaatttg 1440
 ctattctgca ttttcaaaaa aaaaaaaaaa aaaaaaaaaa aa 1482

<210> 9
 <211> 1906
 <212> DNA
 <213> Nucleotide sequence of genomic H12

<400> 9
 aaatacaaag gtgaccttat tttgcaaata atccatgcat ggaaatgcat catccttttg 60
 aaaatgggtt tatctgaatt cttaagttac gtgaaaattt aatacatttc atttttagata 120
 aattttattat taaaattcac acttagatgg cctaaaaatt aacacttatt tttacaatt 180
 caaataaaat atacgacgaa atgagtgtaa tttagttggt taagcatcgt caaagcttgg 240
 agagaaagat catagtttga tctttgaaaa ctatactatt gaaaagggtg aagatatcta 300
 acctccaaca aaattttatt gatagtcgat tcaaattatc aaaatttgga aaatattttg 360
 taaattgtta agttgggaaa aatatgttaa ttttcaaatt accatttgca catttttcta 420
 atctcaaatc acatttaagg gatgttgact actttcgttt tgtacaaatc tttacaattt 480
 taacatttat aaaatgtgtt ttggtagata aaaagtgtga gtattcttta taagagattg 540
 tgtttttctt ttgttttaac ttataaaata aatatatatt ttattttatt ttaacgtgag 600
 attgtaagaa ttcattataa gattatgtca ttccctcaaa agaaaattag atgatgtcat 660
 tttcataact cattttctat aaatacagaa aatcctcaaa aatgaaaaac ctcggtcaaa 720
 aaataaaaga aaaacatcaa tagtggactg gcccacactc attgctttgc tttagtatga 780
 gaaagtagac ctaccaaacc acgaaccgga cgccgaccgg ttcaaccaa catcacacca 840
 attttcctaa accataccgg tttttccctc ccttatataa ccatcctctc cctcttctc 900
 taaccaagct tcattcaact cttcaacaca tatcagaac agaaaaaga agcaaaacat 960
 tccaagaatt taacaatggc aaccaacgaa gatcaaaagc aaactgaatc tggaagacat 1020
 caagaagttg gtcacaagag tcttttacia agtgatgctc tttaccagta tattctagag 1080
 accagtgtct tcccaagaga acatgaagcc atgaaagagt tgagagaggt cacagcaaaa 1140
 caccatgga acatcatgac aacctctgca gatgaaggac aatttttgag catgctcctt 1200
 aaacttatca atgctaagaa taccatggaa attggtgtct acactggcta ctccctcctt 1260
 gccactgccc tagctattcc tgaagatgga aagattttgg ctatggacat taacaaagaa 1320
 aattacgaat tgggtctacc tgtaattaaa aaagctggtg ttgatcacia aattgatttc 1380
 agagaaggtc cagctcttcc agttcttgat gaaatgatca aagacgaaaa gaatcatggt 1440

```

agctacgatt tcatttttgt ggatgctgac aaagacaatt acctcaacta ccataagagg 1500
ttaattgatac ttgttaaagt gggaggtgtg atcgggtacg acaacacctt atggaatgga 1560
tctgtgggttg caccacctga tgctccattg aggaagtatg ttaggtacta tagagatttt 1620
gttttggagc ttaacaaggc tttggctgtg gaccctagga ttgaaatatg tatgcttcct 1680
gttggtgatg gaatcactat ctgccgtagg atcaagtaat tggtttgcac gtgcactata 1740
tcatgtaatg cactgctcca cattattgat cattattgtg tggaagctac agagcattta 1800
aaagtcttca agccttcttg tcttttggtta tttttcttca acatatttgt ggttgtaatt 1860
ttctcttgtc attgatattg aaacttcgaa taattgaaag ttatat 1906

```

```

<210> 10
<211> 157
<212> PRT
<213> Amino acid sequence encoded by H7 coding region

```

```

<400> 10

```

```

Met Gly Val Phe Thr Phe Asn Asp Glu His Val Ser Thr Val Ala Pro
1           5           10           15

```

```

Ala Lys Leu Tyr Lys Ala Leu Ala Lys Asp Ala Asp Glu Ile Val Pro
          20           25           30

```

```

Lys Val Ile Ser Ala Ala Gln Ser Val Glu Ile Val Glu Gly Asn Gly
          35           40           45

```

```

Gly Pro Gly Thr Ile Lys Lys Leu Ser Ile Val Glu Asp Gly Lys Thr
          50           55           60

```

```

Asn Phe Val Leu His Lys Leu Asp Ser Val Asp Glu Ala Asn Phe Gly
65           70           75           80

```

```

Tyr Asn Tyr Ser Leu Val Gly Gly Thr Gly Leu Asp Glu Ser Leu Glu
          85           90           95

```

```

Lys Val Glu Phe Glu Thr Lys Ile Val Ala Gly Ser Asp Gly Gly Ser
          100           105           110

```

```

Ile Val Lys Ile Ser Val Lys Tyr His Thr Lys Gly Asp Ala Thr Leu
          115           120           125

```

```

Ser Glu Ala Val Arg Glu Glu Thr Lys Ala Lys Gly Thr Gly Leu Ile
          130           135           140

```

```

Lys Ala Ile Glu Gly Tyr Val Leu Ala Asn Pro Asn Tyr
145           150           155

```

<210> 11
 <211> 247
 <212> PRT
 <213> Amino acid sequence encoded by H12 coding region

<400> 11

Met Ala Thr Asn Glu Asp Gln Lys Gln Thr Glu Ser Gly Arg His Gln
 1 5 10 15

Glu Val Gly His Lys Ser Leu Leu Gln Ser Asp Ala Leu Tyr Gln Tyr
 20 25 30

Ile Leu Glu Thr Ser Val Phe Pro Arg Glu His Glu Ala Met Lys Glu
 35 40 45

Leu Arg Glu Val Thr Ala Lys His Pro Trp Asn Ile Met Thr Thr Ser
 50 55 60

Ala Asp Glu Gly Gln Phe Leu Ser Met Leu Leu Lys Leu Ile Asn Ala
 65 70 75 80

Lys Asn Thr Met Glu Ile Gly Val Tyr Thr Gly Tyr Ser Leu Leu Ala
 85 90 95

Thr Ala Leu Ala Ile Pro Glu Asp Gly Lys Ile Leu Ala Met Asp Ile
 100 105 110

Asn Lys Glu Asn Tyr Glu Leu Gly Leu Pro Val Ile Lys Lys Ala Gly
 115 120 125

Val Asp His Lys Ile Asp Phe Arg Glu Gly Pro Ala Leu Pro Val Leu
 130 135 140

Asp Glu Met Ile Lys Asp Glu Lys Asn His Gly Ser Tyr Asp Phe Ile
 145 150 155 160

Phe Val Asp Ala Asp Lys Asp Asn Tyr Leu Asn Tyr His Lys Arg Leu
 165 170 175

Ile Asp Leu Val Lys Val Gly Gly Val Ile Gly Tyr Asp Asn Thr Leu
 180 185 190

Trp Asn Gly Ser Val Val Ala Pro Pro Asp Ala Pro Leu Arg Lys Tyr
 195 200 205

Val Arg Tyr Tyr Arg Asp Phe Val Leu Glu Leu Asn Lys Ala Leu Ala
 210 215 220

<212> DNA

<213> Nucleotide sequence of nested PCR primer 2R

<400> 17

agcgtgggtcg cggccgaggt

20

<210> 18

<211> 10

<212> DNA

<213> Nucleotide sequence of complement (partial)

<400> 18

ggcccgtcca

10

<210> 19

<211> 10

<212> DNA

<213> Nucleotide sequence of complement (partial)

<400> 19

gccgggtcca

10